Thesis/
Reports
WY State
For. Div.

THE CENTER FOR SEMIARID AGROFORESTRY

WYOMING FIELD WINDBREAK RENOVATION

Sieck Brothers Farm

PROJECT SUMMARY

Prepared By:
WYOMING STATE FORESTRY DIVISION

January, 1994

28-C2-640 Final Report

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LIBRARY COPY
ROCKY MTN. FOREST & RANGE
EXPERIMENT STATION

INTRODUCTION

A field windbreak renovation demonstration project was planted on the Sieck Brothers farm near Lingle, Wyoming. The project was a joint effort between the USDA Forest Service - Center for Semiarid Agroforestry, Lincoln, Nebraska (CSA); Lingle - Fort Laramie Conservation District (LFLCD); USDA Soil Conservation Service (SCS); Wyoming Association of Conservation Districts (WACD); University of Wyoming Cooperative Extension Service; and Wyoming State Forestry Division (WSFD).

The CSA provided cost-share funding to support the demonstration project while the landowner and other cooperators provided various services to complete the project. The project is used to demonstrate renovation techniques, the benefits of field windbreaks and the use of new tree planting technologies.

Implementation Plan
Field Windbreak Renovation
Sieck Brothers

The field windbreak renovation for the Sieck Brothers farm near Lingle, Wyoming began in the fall of 1992. Phases scheduled were: Fall 1992 to remove some of the existing dead Siberian elm and cottonwood from the field windbreak; root pruning and site preparation; planting was completed in Spring 1993 and maintenance will be ongoing.

FALL 1992

Renovation design called for the removal of some trees, pruning low hanging branches that could obstruct the use of equipment for site preparation and planting, and actual site preparation. A total of 219 trees were in the old windbreak with 43 removed. The remaining trees were left in place to provide protection until the newly planted windbreak gets established. Trees designated for removal were located and marked by representatives from the WSFD and LFLCD. Actual pruning and removal was accomplished by the landowners representative and LFLCD members.

Site preparation was completed prior to the ground freezing. A strip eight feet wide and 12 to 15 inches deep was prepared for each new planting row. There were 5,120 total lineal feet prepared. Because of existing tree roots, a ripper was used 18 inches deep and 8 feet from the existing tree row. Tilling and discing followed to prepare the planting strip. This too was accomplished by the landowners representative.

SPRING 1993

In late April, the planting strips were disced and tilled prior to planting. Planting stock arrived in late April. Planting occurred as soon after stock arrival as possible. Weed barrier fabric was installed after planting to reduce maintenance, conserve soil moisture, and benefit growth and survival of the windbreak. This phase was accomplished by conservation district employees and planting crew.

Once the planting and weed barrier installation were completed the drip irrigation system was installed. Design for the drip irrigation system was completed in October, 1992 by the SCS and conservation district. The system was placed on top of the weed barrier and held in place using wire staples.

MAINTENANCE PLAN

IRRIGATION

The trees were watered on a 5 to 7 day interval. This is the responsibility of the Landowner. The drip irrigation system will be checked in early spring for replacement of missing emitters, breaks in dripline and replacing the pressure regulators. The drip system was shut down this fall and lines drained. This was a joint effort between the District and the landowner. Gypsum blocks were installed by the District to monitor the soil moisture during Summer months and also during the Winter. If soil moisture is low, supplemental water will be provided by the Landowner. The District checks the site on a monthly basis to make sure everything is going as planned.

WEED CONTROL

Weeds around the seedling trees are being removed by the Districts on a as needed basis. Even though weed barrier material minimizes maintenance, additional weeding around openings cut at seedlings is needed to maximize growth and survival.

TREE REPLACEMENT

The District is responsible to replace any dead trees until all species are well established within the demonstration site. The District is responsible for the actual replanting.

INSECT AND DISEASE

The Planting is being monitored for insect problems and problems will be addressed as they arise. The Landowner and Conservation District are jointly monitoring the planting for pest problems. The University of Wyoming Cooperative Extension Service and State Forestry Division will assist in identification and control recommendations as requested.

LIVESTOCK

If livestock are allowed in the area, an electric fence will be installed around the planting for livestock exclusion. The landowner will be responsible for necessary fencing.

TECHNOLOGY TRANSFER PLAN

Windbreak renovation has not been widely used in Wyoming and field windbreaks are not common except in localized areas in the southeast part of the state. This project will be used to demonstrate renovation techniques on a field windbreak.

Conservation District and WSFD personnel are documenting using slides of the various phases of the project for use in future presentations. In addition to the slide-show, photos and articles on the project and renovation have and will be placed in the LFLCD newsletter, the WACD newsletter and rural newspapers. Renovation will be promoted and the benefits of field windbreaks emphasized. With the recent "Halloween Freeze" induced Siberian Elm mortality, many more farmstead and field windbreaks are in immediate need of renovation.

The LFLCD and UW Cooperative Extension Service will conduct field tours of programs and projects with various groups. This project will be used by these groups in future tours.

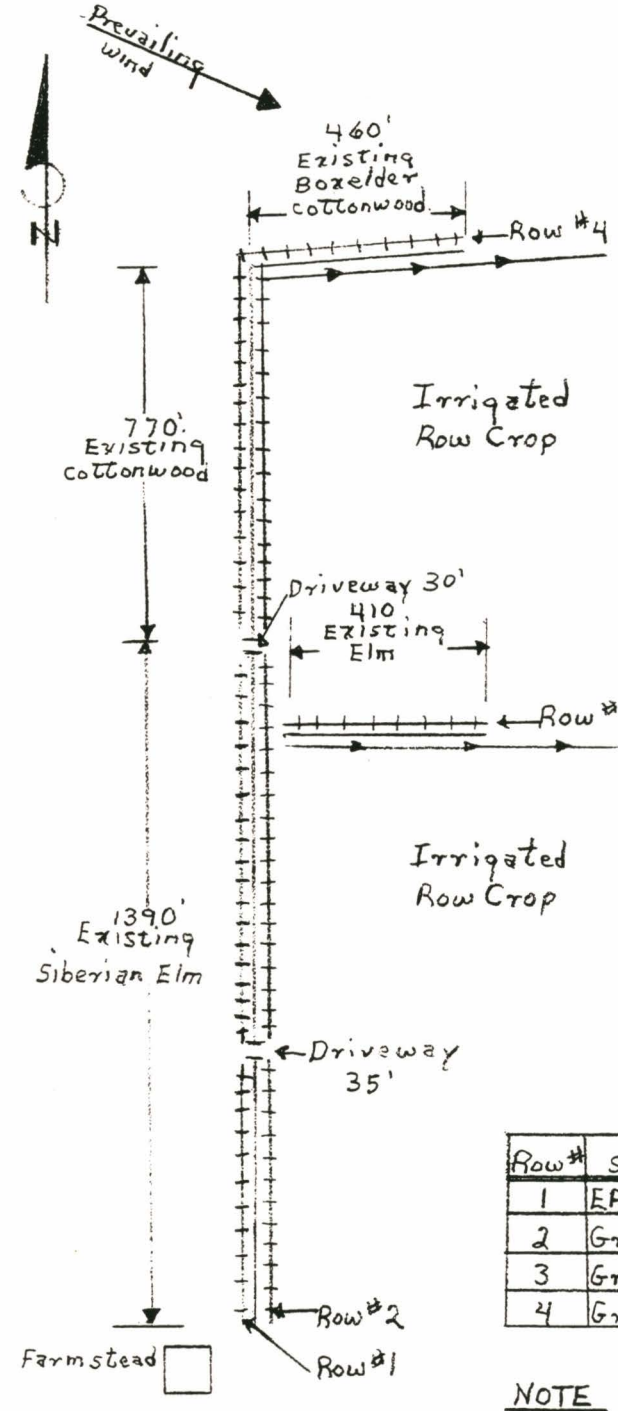
An interpretive sign is being designed stating the project, its goals, and listing the cooperators. The sign will be placed at the planting site in the Spring, 1994.

A project summary or report was made at the annual convention of the WCD November, 1993. The LFLCD Convention display centered on the renovation project.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE	PROJECT			
Wyoming	Sieck Bros. Field Windbreak			
BY: L. Nighswonger	DATE: 9-28-92	CHECKED BY: D. PERKO	DATE: 9/29/92	JOB NO.
SUBJECT: Windbreak Renovation				SHEET 1 OF 1



Scale 1 inch = 400 ft

Legal Description

SE ¼ of SE ¼ Sec. 2 and
NE ¼ of NE ¼ Sec. 11
Township 25 North
Range 63 West.

Row #	Species	Spacing of trees in row	Spacing Between Rows	No. Trees Needed	Length of Row
1	E.R. Cedar	6	20 ft	354	2125
2	Green Ash	12		177	2125
3	Green Ash	12	10' To Existing	34	410
4	Green Ash	12	10' To Existing	39	460

NOTE

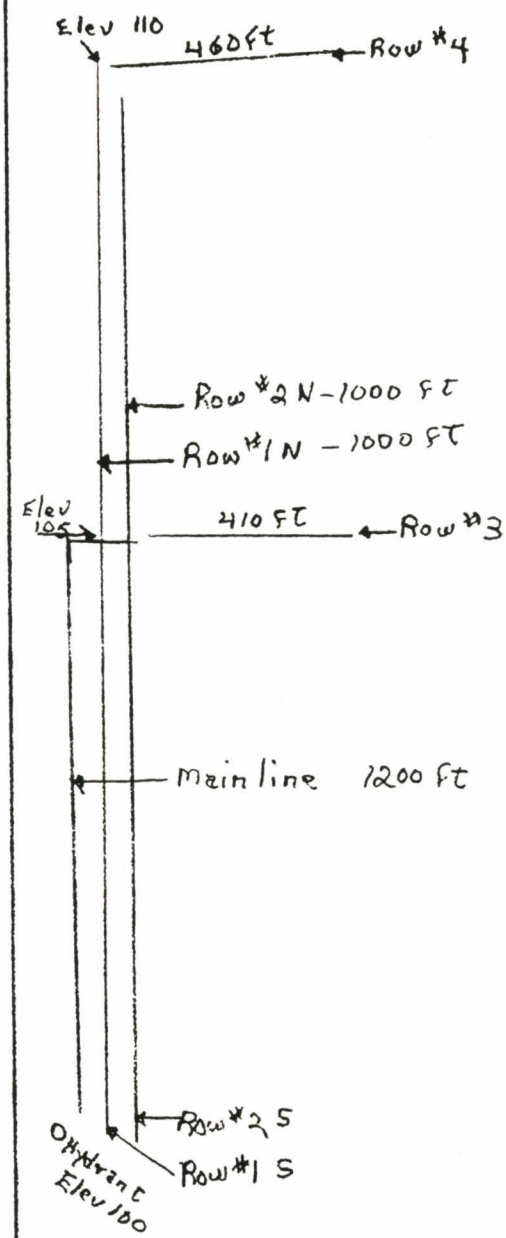
Depending on availability Hackberry may be substituted for Green Ash, and Rocky Mtn. Juniper for Eastern Red Cedar.

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
Wyoming		Sieck Bros Field Windbreak Drip Irrig.		
BY	DATE	CHECKED BY	DATE	JOB NO.
Larry N	Oct 23, 92			
SUBJECT				SHEET 1 OF 5
Hydraulic Design				

Layout



No. of plants

Row #1S - 200
Row #1N - 166
Row #2S - 100
Row #2N - 83
Row #3 - 34
Row #4 - 38

STATE		PROJECT		
Wyoming		Sieck Bros. Field Windbreak Drip Irrig.		
BY	DATE	CHECKED BY	DATE	JOB NO.
Larry N	Oct 23, 92			
SUBJECT				SHEET 2 OF 5
Hydrulac Design				

Main line

Try 1" ϕ plastic (1.189 ID). will be above ground.

Consider length to be 1200 ft + 10% = 1320 ft

High point in line is at inlet to Row #1 North

min. pressure at this point = 5 psi

$H_p = 11.5$ ft

Available Head = $\frac{2}{3}$ of Hydrant pressure

$= \frac{2}{3} \times 30$ psi

$= 20$ psi

$H_A = 46$ ft

Head loss at 3.3 gpm or 200 gph - .34 / 100'

$H_F = .34 \times \frac{1320}{100} = 4.5$ psi

@ $4.5 \times 2.31 = 10.4$ ft H_p

Elev change = $H_e = 105 - 100 = 5$ ft

Total = $H_p + H_F + H_e$

$= 11.6 + 10.4 + 5 = 27$ ft

This is < $H_A = 46$ ft so OK

Head available at each row = $H_a - H_F - H_e$

Row #1 : $46 - 10.4 - 05 = 30$ ft = 13.3

Row #2 $46 - (.34 \times \frac{1340}{100} \times 2.31) - 105 - 100 = 30.5 = 13.2$ psi (110,52)

STATE		PROJECT		
Wyoming		Sieck Bros Field Windbreak Drip Irrig		
BY	DATE	CHECKED BY	DATE	JOB NO.
Larry N	Oct 23, 92			
SUBJECT				SHEET 3 OF 5
Hydraulic Design				

Feeder lines

Try ¾" ϕ plastic (0.8 ID)

Row # 1 North

Length to be 1000 ft + 5% = 1050

Consider emitters to be on line w/ barbed conn.

No. of emitters ne = 166

Table 2 F = 0.36

Table 3 Equiv. pipe length per emitter = 1.5

Discharge = 166 gph

hf = .8 psi per 100 ft

$$H_F = h_f \left(\frac{\text{Length} + 1.5 \times 166}{100} \right) .36$$

$$= .8 \left(\frac{1050 + 1.5 \times 166}{100} \right) .36$$

$$= (8)(12.9)(.36)$$

$$= 3.7 \text{ psi}$$

$$= 8.6 \text{ ft}$$

Pressure at end of line = 30 − 8.6 − 5

= 16.4 ft

= 7.0 > 5 psi

Row # 1 South

No. of emitters ne 200

Table 2 F = .36

Table 3 Equiv pipe length per emitter = 1.5

STATE Wyoming		PROJECT Sieck Bros feild Windbreak Drip Irrig		
BY Larry N	DATE Oct 23 1992	CHECKED BY	DATE	JOB NO.
SUBJECT Hydraulic Design				SHEET 4 OF 5

Discharge 200 gph

Table 1 h_f = 1.2 psi per 100 Ft

$H_f = (1.2)(12)(.36) =$

$= 5.18$ psi

$= 11.97$ Ft

Pressure at end of line = $30 - 11.97 + (115 - 100)$

$= 23.03$ ft

$= 9.9$ psi

Row #2 and #4 North

No. of emitters ne 121

Table 2 F = .36

Table 3 Equiv pipe length per emitter = 1.5

Discharge 120 gph

Table 1 $h_f = .46$

$H_f = (.46)(14.6)(.36)$

$= 2.41$ PSI

$= 5.5$ Ft

Pressure at end of line = $30.5 - 5.5 + (105 - 100$

$= 20$ Ft

$= 8.6$ PSI so ok

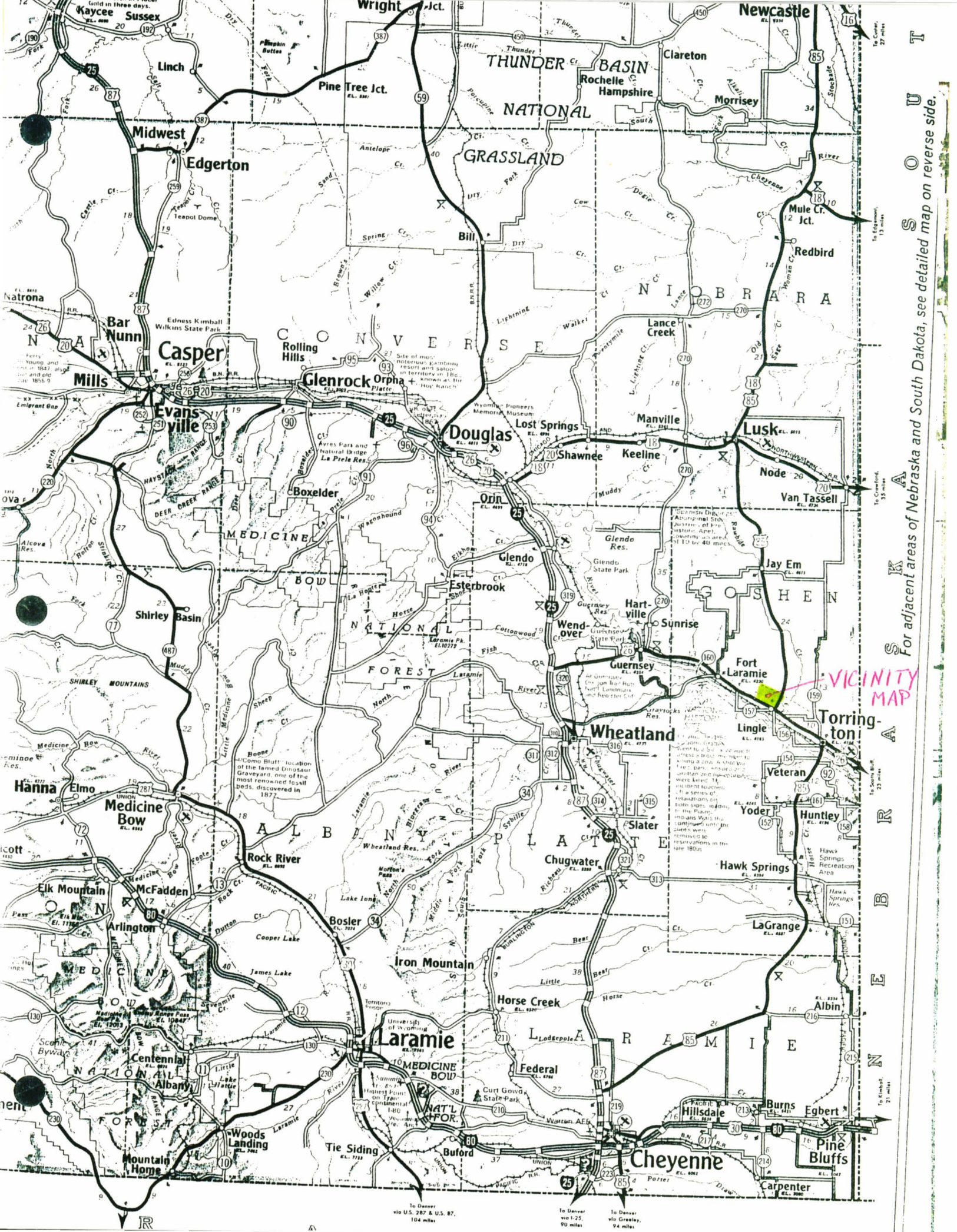
Rows # 1-2 south & Row #3 obviously ok

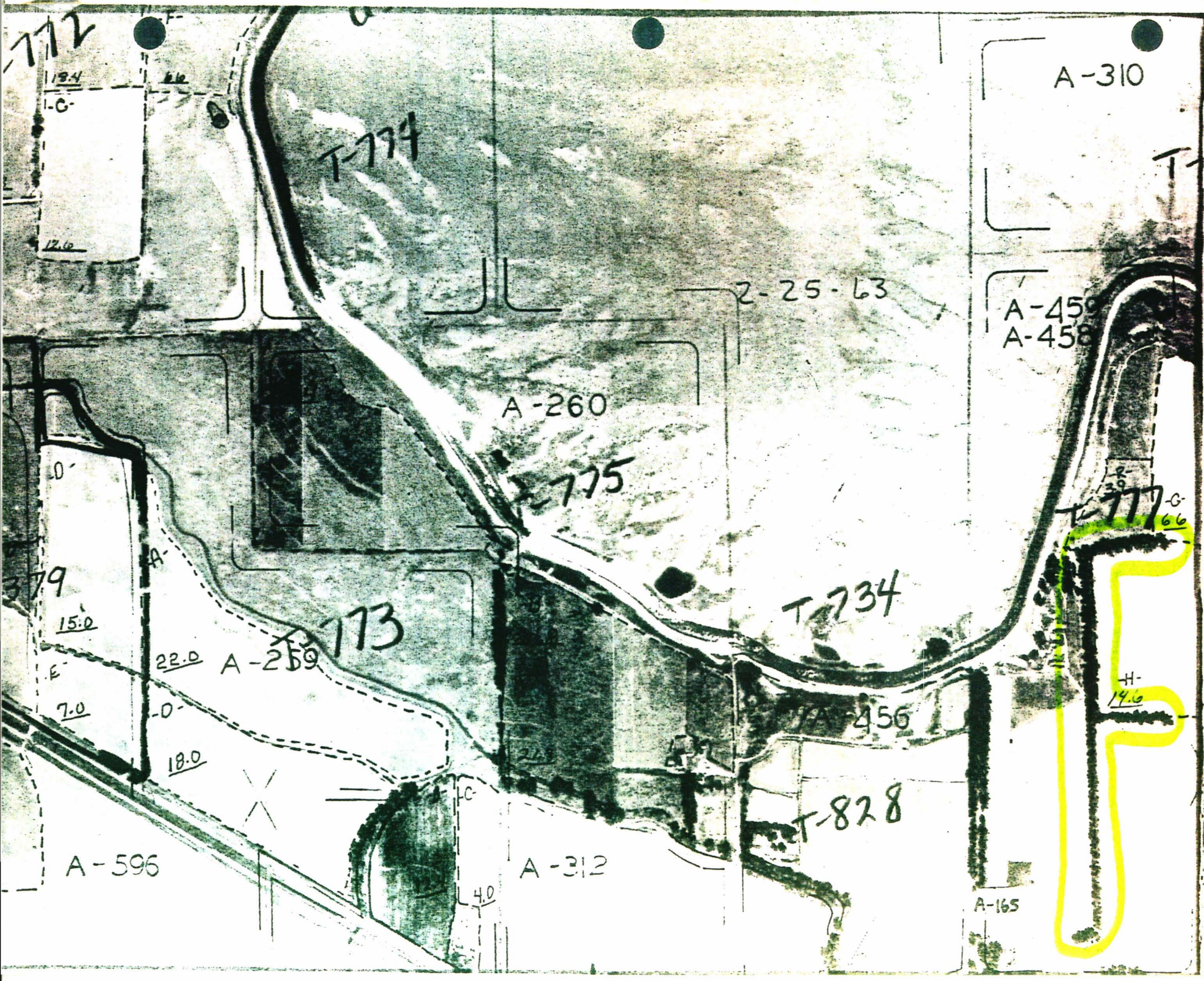
COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
Wyoming		Sieck Bros field Windbreak Drip Irrig.		
BY	DATE	CHECKED BY	DATE	JOB NO.
Larry N	Oct 23 1992			
SUBJECT				SHEET 5 OF 5

Place valves at all inlets. Irrigate Rows#
1-South - 1 North 2 North individually. Rows
2 South and 3 water at same time. $\frac{1}{2}$" ϕ pipe
is sufficient for row #3.
Row #4 is designed to irrigate with Row # 2 North


Wright Jct.
Newcastle
Kaycee
Sussex
Linch
Pine Tree Jct.
Clareton
THUNDER BASIN NATIONAL GRASSLAND
Rochelle Hampshire
Morrisey
Midwest
Edgerton
Bill
Redbird
Mule Cr. Jct.
Natrona
Bar Nunn
Edness Kimball Wilkins State Park
Casper
Rolling Hills
Glenrock
Orpha
Platte
Mills
Evansville
Douglas
Lost Springs
Manville
Lusk
Lance Creek
Shawnee
Keeline
Node
Van Tassell
Boxelder
Orin
Glendo
Esterbrook
Jay Em
Shirley Basin
Hartville
Sunrise
Wendover
Guernsey
Fort Laramie
VICINITY MAP
Lingle
Torrington
Wheatland
Veteran
Yoder
Huntley
Slater
Hanna
Elmo
Medicine Bow
Rock River
Chugwater
Hawk Springs
Elk Mountain
McFadden
Arlington
Bosler
LaGrange
Iron Mountain
Horse Creek
Albin
Laramie
Centennial
Federal
Hillsdale
Burns
Egbert
Woods Landing
Mountain Home
Tie Siding
Buford
Cheyenne
Pine Bluffs
Carpenter
SHIRLEY MOUNTAINS
MEDICINE BOW NATIONAL FOREST
ALBANY
PLATTE
CONVERSE
NIOBRARA
GOSHEN
LARAMIE
For adjacent areas of Nebraska and South Dakota, see detailed map on reverse side.


T-772
19.4
66
-C-
12.6
T-774
A-310
2-25-63
A-459
A-458
A-260
T-775
T-777
-G-
66
T-734
T-773
A-259
15.0
22.0
7.0
18.0
A-596
A-312
A-456
T-828
4.0
A-165
-H-
14.6
NOT TO SCALE
GOSHEN COUNTY PROGRAM YR
G-15

EXISTING FIELD WINDBREAK CONDITIONS AND CROPS

REMOVAL AND PRUNING OF DESIGNATED TREES BY MEMBERS OF THE LINGLE-FORT LARAMIE CONSERVATION DISTRICT

INSTALLATION OF GYPSUM BLOCKS FOR SOIL MOISTURE MONITORING

TREE PLANTING BY THE DISTRICT TREE PLANTING CREW

WEED BARRIER INSTALLATION

COMPLETED PROJECT